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January 16, 2009

**U.S. PATENT AND TRADEMARK OFFICE  
FACSIMILE TRANSMISSION COVER SHEET****RECEIVED**  
**CENTRAL FAX CENTER****JAN 16 2009**

<b>To:</b> In re the Application of  Georges GROS et al.  Application No.: 10/500,715  Filed: November 5, 2004  <b>For:</b> METHOD FOR THE PURIFICATION OF ACROLEIN	<b><u>FOR DISCUSSION PURPOSES ONLY</u></b>  Group Art Unit: 1797  Docket No.: 120163
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**Examiner:** V. MANOHARAN**Facsimile:** (571) 273-1450**From:** Jeff Bousquet**Prepared By:** jrb**Number of Pages Sent (Including cover sheet):** 11**Comments:**

As, requested, attached is a copy of the Supplemental Amendment we e-filed yesterday.

**Sent by:** mms

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**RECEIVED  
CENTRAL FAX CENTER****JAN 16 2009****PATENT APPLICATION****IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re the Application of

Georges GROS et al.

Group Art Unit: 1797

Application No.: 10/500,715

Examiner: V. MANOHARAN

Filed: November 5, 2004

Docket No.: 120163

For: METHOD FOR THE PURIFICATION OF ACROLEIN

**SUPPLEMENTAL AMENDMENT**Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

As a supplement to the Amendment filed October 21, 2008 in reply to the July 31,  
2008 Office Action, please further consider the following:

**Amendments to the Specification;****Amendments to the Claims as reflected in the listing of claims; and****Remarks.**

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**Amendments to the Specification:**

Please replace the Abstract with the attached amended Abstract.

Application No. 10/500,715

**Amendments to the Claims:**

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Previously Presented) A continuous process for the manufacture of 3-(methylthio) propionaldehyde, the process comprising:
  - (a) subjecting propylene to vapor-phase oxidation using a catalyst, to obtain a crude acrolein-based product;
  - (b) removing acids present in the crude acrolein-based product;
  - (c) absorbing the crude acrolein-based product with water to obtain an aqueous acrolein solution;
  - (d) purifying the aqueous acrolein solution to obtain purified gaseous acrolein by a process comprising:
    - introducing the aqueous acrolein solution into a distillation column equipped at its base with at least one boiler and at its top with at least one condenser,
    - withdrawing a liquid mixture essentially comprising water at the base of the distillation column,
    - withdrawing a gas mixture essentially comprising acrolein and water at the top of the distillation column,
    - cooling the gas mixture withdrawn at the top of the distillation column in the condenser, to a temperature which makes it possible to obtain, on the one hand, an aqueous condensate and, on the other hand, an acrolein-rich gas mixture, and
    - withdrawing the acrolein-rich gas mixture; and
  - (e) reacting the purified gaseous acrolein with methyl mercaptan, to obtain 3-(methylthio) propionaldehyde;

wherein:

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noncondensable gases produced in step (a) are separated from the acrolein prior to step (e).

2. (Previously Presented) The process as claimed in claim 1, wherein the noncondensable gases produced in step (a) are separated from the acrolein prior to step (d).

3. (Previously Presented) The process as claimed in claim 2, wherein the noncondensable gases produced in step (a) are separated from the acrolein prior to step (c).

4. (Previously Presented) The process as claimed in claim 3, wherein the noncondensable gases produced in step (a) are separated from the acrolein in steps (b) and (c).

5. (Previously Presented) The process as claimed in claim 1, wherein the noncondensable gases separated from the acrolein are recycled to the vapor-phase oxidation reaction of step (a).

6. (Previously Presented) The process as claimed in claim 1, wherein the noncondensable gases separated from the acrolein are discharged and incinerated.

7. (Previously Presented) A continuous process for the manufacture of 3-(methylthio) propionaldehyde, the process comprising:

- (a) subjecting propylene to vapor-phase oxidation using a catalyst, to obtain a crude acrolein-based product;
- (b) removing acids present in the crude acrolein-based product;
- (c) absorbing the crude-acrolein product with water to obtain an aqueous acrolein solution separated from noncondensable gases,
- (d) purifying the aqueous acrolein solution to obtain purified gaseous acrolein by a process comprising:

introducing the aqueous acrolein solution into a distillation column equipped at its base with at least one boiler and at its top with at least one condenser,

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withdrawing a liquid mixture essentially comprising water at the base of the distillation column,

withdrawing a gas mixture essentially comprising acrolein and water at the top of the distillation column,

cooling the gas mixture withdrawn at the top of the distillation column in the condenser, to a temperature which makes it possible to obtain, on the one hand, an aqueous condensate and, on the other hand, an acrolein-rich gas mixture, and

withdrawing the acrolein-rich gas mixture, and

(e) reacting the purified gaseous acrolein directly with methyl mercaptan to obtain 3-(methylthio) propionaldehyde.

8. (Previously Presented) The process as claimed in claim 1, wherein purified gaseous acrolein is reacted with gaseous methyl mercaptan in step (e).

9. (Canceled)

10. (Previously Presented) The process as claimed in claim 1, wherein the aqueous acrolein solution has a concentration of acrolein of less than or equal to the solubility limit of acrolein in water.

11. (Currently Amended) The process as claimed in claim 1, wherein the distillation column is maintained at a pressure P and the temperature in the condenser is maintained at a value T according to the equation  $T > 21.28 * P + 32.9$ .

12. (Previously Presented) The process as claimed in claim 11, wherein the distillation column is maintained at atmospheric pressure and the temperature in the condenser is maintained at a value of greater than 54°C.

13. (Previously Presented) The process as claimed in claim 1, wherein the acrolein-rich gas mixture has an acrolein concentration ranging from 86 to 95% by weight.

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14. (Previously Presented) The process as claimed in claim 1, wherein the condensate is at least partially reintroduced into the distillation column.
15. (Previously Presented) The process as claimed in claim 14, wherein all of the condensate is reintroduced at the top of the distillation column.
16. (Currently Amended) A process for the purification of acrolein, the process comprising:
- introducing an aqueous acrolein solution into a distillation column equipped at its base with at least one boiler and at its top with at least one condenser,
  - withdrawing a liquid mixture comprising water at the base of the distillation column,
  - withdrawing a gas mixture comprising acrolein at the top of the distillation column,
  - cooling the gas mixture withdrawn at the top of the distillation column in the condenser, to a temperature which makes it possible to obtain, on the one hand, an aqueous condensate and, on the other hand, an acrolein-rich gas mixture, and
  - withdrawing the acrolein-rich gas mixture,
- wherein:
- the liquid mixture withdrawn at the base of the distillation column is a nonazeotropic liquid mixture essentially comprising water;
  - the aqueous condensate is substantially depleted in acrolein; and
  - the acrolein-rich gas mixture is substantially enriched in acrolein.
17. (Previously Presented) The process as claimed in claim 16, wherein the gas mixture obtained at the distillation column top comprises, by volume, between 30% and 70% of water.

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18 (Currently Amended) The process as claimed in claim 7, wherein the methyl mercaptan of step (e) is ~~carried out between methyl mercaptan and acrolein maintained in the~~ gas phase.

19. (Canceled)



### **REMARKS**

Claims 1-8 and 10-18 are pending in this application. By this Amendment, the Abstract and claims 11 and 18 are amended. No new matter is added.

In view of the foregoing amendments and following remarks, reconsideration and allowance are respectfully requested.

The courtesies extended to Applicants' representative by Examiner Manoharan during the telephone interviews held January 8, 2009 and January 15, 2009, are appreciated. The reasons presented during the interview as warranting favorable action are incorporated into the remarks below, which constitute Applicants' record of the interview.

Examiner Manoharan contacted Applicants' representative to discuss the issues detailed below, and recommended that Applicants' file a Supplemental Amendment to resolve these issues to place the application in condition for allowance.

#### **Claims 2-6: Antecedent basis for "the noncondensable gases produced in step (a)"**

As discussed during the January 15 telephone interview, the antecedent basis for the recitation of "the noncondensable gases produced in step (a)" in claims 2-6 may be found at the end of claim 1 where it recites, "wherein: noncondensable gases produced in step (a) are separated from the acrolein prior to step (e)."

#### **Claim 11: "a value T according to the equation $T > 21.28 * P + 32.9$ "**

Examiner Manoharan objected to the recitation of "a value T according to the equation  $T > 21.28 * P + 32.9$ ," asserting that " $T > 21.28 * P + 32.9$ " is not an equation. By this Amendment, claim 11 is amended to delete the recitation of "the equation."

#### **Claim 18**

Examiner Manoharan indicated that claim 18 does not appear to limit claim 7 from which it depends. By this Amendment, claim 18 is amended to recite, "The process as claimed in claim 7, wherein the methyl mercaptan of step (e) is in the gas phase." Support for

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amended claim 18 may be found, for example, in claim 7 and in the specification at page 8, lines 5-8.

**Abstract**

Examiner Manoharan objected to the Abstract for including the term "comprising." By this Amendment, the Abstract is amended to recite "containing" instead of "comprising."

\* \* \* \* \*

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,

William P. Berridge  
Registration No. 30,024

Jeffrey R. Bousquet  
Registration No. 57,771

WPB:JRB

Attachment:  
Amended Abstract

Date: January 15, 2009

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### ABSTRACT

A process for purifying an aqueous acrolein solution to obtain purified gaseous acrolein by introducing the aqueous acrolein solution into a distillation column equipped at its base with at least one boiler and at its top with at least one condenser, withdrawing a liquid mixture essentially ~~comprising~~ containing water at the base of the distillation column, withdrawing a gas mixture essentially ~~comprising~~ containing acrolein and water at the top of the distillation column, cooling the gas mixture withdrawn at the top of the distillation column in the condenser, to a temperature which makes it possible to obtain, on the one hand, an aqueous condensate and, on the other hand, an acrolein-rich gas mixture, and withdrawing the acrolein-rich gas mixture.